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OPERATION
AND
MAINTENANCE
MANUAL

THE FOUR WHEEL DRIVE AUTO CO.

Clintonville, Wis., U.S.A.

MODEL SU-COE — 6-6 TON
4x4 TRUCK

BUILT FOR

UNITED STATES ARMY

Contract Number W-398-QM-DA-121

Contract Awarded 12-4-41

OPERATION AND MAINTENANCE MANUAL

MODEL SU-COE

FWD

CONTRACT NUMBER
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SERIAL NUMBERS
62841—63191 Inc.
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Prepared By
The Four Wheel Drive Auto Co.
Service Department
Clintonville, Wis., U. S. A.

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Clutch 02
Fuel System 03
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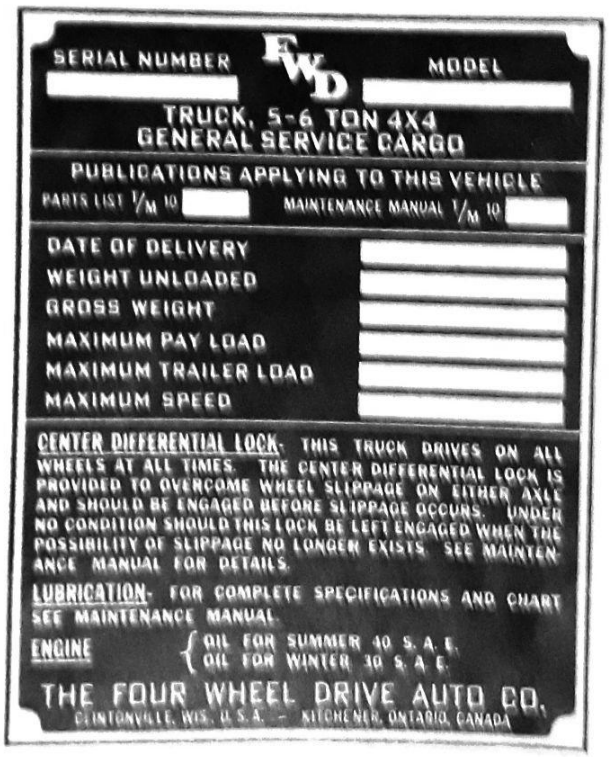
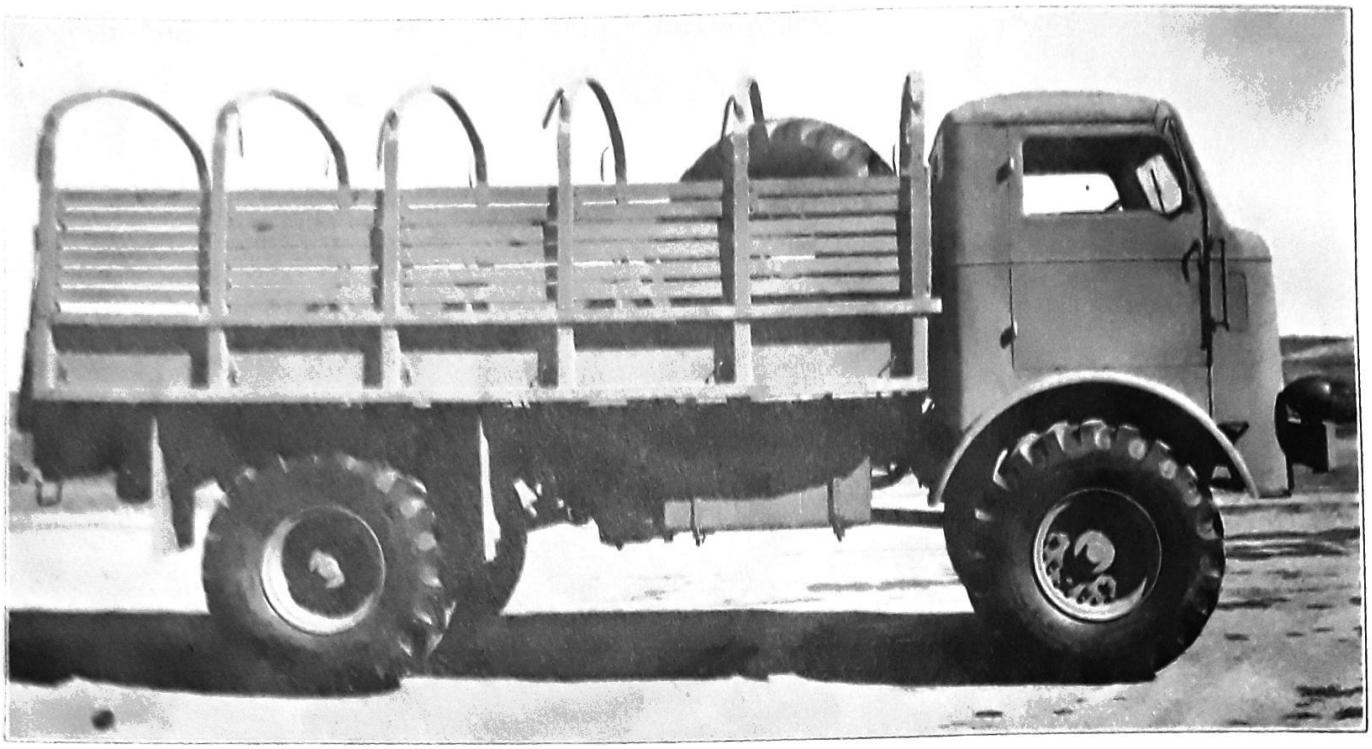
INTRODUCTION

This operation and maintenance manual is designed to help the operator or mechanic in selecting the unit on which he desires to receive information. It presents operation and repair instructions, general specifications and data used in this vehicle. It is grouped in a convenient and understandable manner in sections which are numbered and tabbed to correspond with tabs on the index page. The numbering and names of the sections are identical with those in the parts book.


SERIAL NUMBER
FWD
MODEL
TRUCK, 5-6 TON 4X4
GENERAL SERVICE CARGO
PUBLICATIONS APPLYING TO THIS VEHICLE
PARTS LIST 1/M 10
MAINTENANCE MANUAL 1/M 10
DATE OF DELIVERY
WEIGHT UNLOADED
GROSS WEIGHT
MAXIMUM PAY LOAD
MAXIMUM TRAILER LOAD
MAXIMUM SPEED
CENTER DIFFERENTIAL LOCK- THIS TRUCK DRIVES ON ALL WHEELS AT ALL TIMES. THE CENTER DIFFERENTIAL LOCK IS PROVIDED TO OVERCOME WHEEL SLIPPAGE ON EITHER AXLE AND SHOULD BE ENGAGED BEFORE SLIPPAGE OCCURS. UNDER NO CONDITION SHOULD THIS LOCK BE LEFT ENGAGED WHEN THE POSSIBILITY OF SLIPPAGE NO LONGER EXISTS. SEE MAINTENANCE MANUAL FOR DETAILS.
LUBRICATION- FOR COMPLETE SPECIFICATIONS AND CHART SEE MAINTENANCE MANUAL.
ENGINE
OIL FOR SUMMER 40 S. A. E.
OIL FOR WINTER 30 S. A. E.
THE FOUR WHEEL DRIVE AUTO CO.
CLINTONVILLE, WIS. U. S. A. — KITCHENER, ONTARIO, CANADA



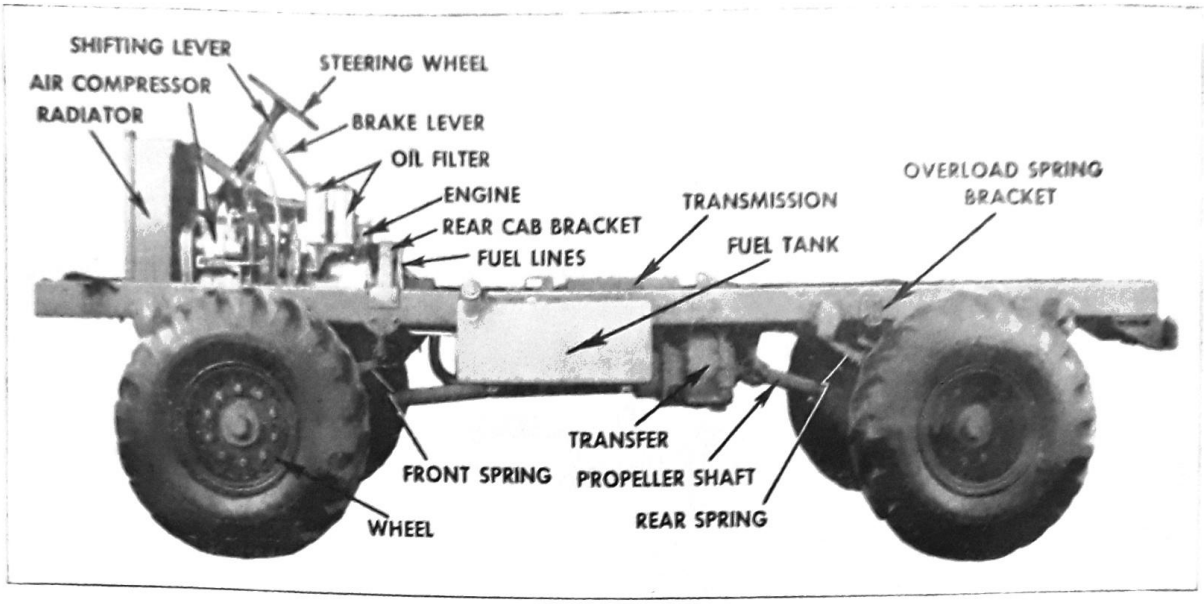
GENERAL DATA

Engine

Type	Waukesha SRKR
H. P. at 2250 R. P. M.	126
Bore	4⅝"
Stroke	5⅛"
Cylinders	6

Capacities

Fuel Tank R. H.—(34.8 Imp. Gals.)	42 U. S. Gals.
Fuel Tank L. H.—(34.8 Imp. Gals.)	42 U. S. Gals.
Engine Crankcase (Refill)—(11.6 Imp. Qts.)	14 U. S. Qts.
Cooling System—(30.7 Imp. Qts.)	37 U. S. Qts.
(Radiator Only)—(18.2 Imp. Qts.)	22 U. S. Qts.
Transmission—(11.6 Imp. Qts.)	14 U. S. Qts.
Transfer—(7.4 Imp. Qts.)	9 U. S. Qts.
Front Axle Differential—(3.3 Imp. Qts.)	4 U. S. Qts.
Rear Axle Differential—(3.3 Imp. Qts.)	4 U. S. Qts.
Oil Bath Air Cleaner—(.8 Imp. Qt.)	1 U. S. Qt.



Left Hand View of Model SU Chassis

OPERATORS INSTRUCTIONS

The truck has been designed and built so that it will furnish a safe, comfortable, and economical means of transportation for thousands of miles. The years of experience and research of the company have made the truck a leader in performance and efficiency. However, no amount of engineering ingenuity or care in the manufacture can take the place of malpractices by the owners or operators. The responsibility of maintaining or arranging for adequate or proper fuel service facilities shall be with the owner or operator.

Protective and safety devices, such as governors to control engine speed, air cleaners, and oil filters to prolong engine life are installed in all models. Oil pressure gauges and temperature gauges, ammeters, and other devices on the vehicle should be familiar to the operator and mechanics, so they will understand when the operation of the truck is correct. The operator and mechanic should have complete understanding of the parts requiring periodic attention. This will include all parts and units requiring lubrication and also all parts which may require occasional adjustments. Parts to be lubricated and units that may need adjustment are thoroughly defined on other pages of the manual.

A new truck requires more careful attention during the first 1000 miles of its life than after the parts have been thoroughly worked in. To obtain best results new trucks should not be driven faster than 65 to 75% of their governed speed for the first 1000 miles.

Occasionally drivers acquire habits in driving which shorten the life of various parts of the truck, a number of which are listed below:

When shifting gears move the gear shift lever as far as it will go, so as to have the gears fully engaged. When gears are not fully engaged, it will cause them to wear rapidly or to chip, and in this way shorten the service which they should give.

Avoid driving with foot resting on the clutch pedal as this may cause the clutch to slip causing premature wear of the facings and of the clutch release bearing. Adjust the clutch pedal when the free movement becomes less than 1". Depress the clutch pedal while starting the engine particularly in cold weather. This lessens the load on the starter and decreases the draw on the battery.

Keep the tires properly inflated, not only to reduce the tire wear and save fuel, but also as a safety measure to improve the braking and steering.

Under extremely dusty conditions owners and operators of trucks should give the air cleaners daily attention to prevent rapid wear of the internal parts of the engine.

In cold weather the cooling system should be protected from freezing by the use of suitable anti-freeze.

These are responsibilities which the owners and operators should assume when the truck is placed in their charge. Failure to maintain these suggestions or responsibilities will result in greatly decreased durability.

When delivery of the equipment is made it is placed into the hands of an operator who is expected to give the truck proper attention in regard to lubricants and make minor adjustments.

We would like to stress the importance of

thoroughly instructing the operator before the equipment is ever placed into his care. If the driver is not thoroughly instructed in the points of lubrication, the care the chassis should receive, and how to properly operate the equipment, he may unintentionally be responsible if maximum performance and economy are not obtained.

Permit us to state that the operation, maintenance, and lubrication are not identical on every make of truck. Some trucks have special features that are outstanding if properly maintained. This does not indicate that a great deal of extra attention must be given to those units, but the adjustments and lubrication should be checked periodically.

MAINTENANCE

The driver and the way in which he drives are the greatest factors in obtaining maximum economy and performance. Good or bad maintenance start with him. Some of the things that contribute to high costs are: (1) Letting the engine idle for long periods. (2) Racing engine when starting. (3) Abuse of brakes. (4) Racing engine down hill. (5) Pulling engine down too far before shifting.

Considering these items in detail: (1) Letting a motor idle for long periods will result in dilution of the oil on the cylinder walls. This means that the cylinder walls, bearings, and pistons will not be properly lubricated. At idling speeds engines have a tendency to draw in more fuel than is actually consumed and the unburned fuel has a tendency to form carbon deposits in the combustion chamber, and foul spark plugs. (2) Racing the engine when first started is harmful to the motor especially so in cool weather. Even although lighter oils are used, the oil circulation is retarded until the engine is properly warmed up. (3) Good brakes are essential so that the truck may be under control at all times. A good driver rarely uses the brake to its full capacity and is aware of the fact that excessive strains are placed on the entire chassis if emergency applications are continually made. (4) To use the engine as a brake may be responsible for a great deal of motor trouble, if engine is forced to turn over faster than the R. P. M. permitted by the governor setting, too great a pressure is placed on the engine bearings and other moving parts. Let us say an engine is governed at 2000 R.P.M. permitting the truck to travel 40 miles per hour in high gear. If this truck were driven down hill at a speed of 45 miles per hour using the engine as a brake momentum of the truck would force the engine to run 200 R.P.M. faster than the governor setting would permit. All drivers should be cautioned to avoid this practice in truck operation. (5) Lugging the engine on long hills at low engine speeds promotes over-heating, and is harmful to all working parts of the engine. It is desirable to have an engine that will pull exceptionally well, therefore, the engine R. P. M. should be kept up by shifting to a lower gear.

Proper lubrication is very important and the first essential is, of course, the selection of a lubricant having good quality and specifications. There is no need to go into this at any length here because complete lubrication specifications are given in a chart on another page.

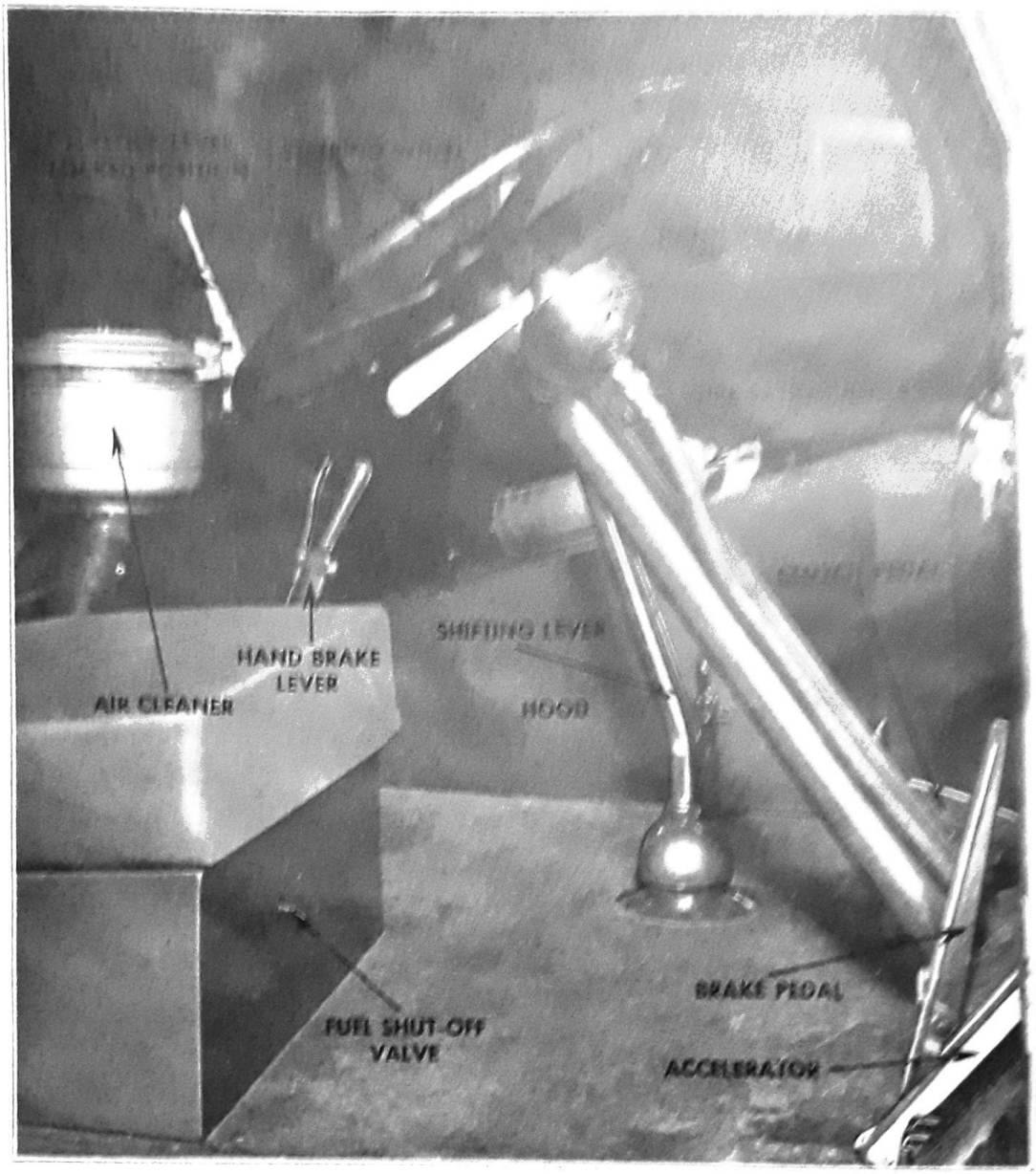
Mechanically, it is essential that parts be kept tight and in line. This need not be a difficult matter if handled in the proper manner. Obviously, the most important items are brakes, steering connections, and frame and spring brackets. Keeping a record of fuel and oil consumption furnishes information on the condition of the carburetor, ignition, valves, rings, and bearings. The condition of the bearings can also be checked from the oil pressure.

There are two common errors made in this matter of maintenance. One is do nothing to the equipment till something fails. The other is to be fussing with it continually. The effect of the first, is that the truck never operates properly. If reasonable attention is given to the equipment and it is not torn down for every little rattle, which will develop and disappear in any truck, much better results will be obtained.

The trucks are usually placed into the hardest type of service; and, therefore, the operator should be very careful to operate the truck correctly.

In heavy duty service, it becomes necessary to shift gears often and if the shift is not properly made, trouble is apt to be experienced. Clashing the gears when shifting is undesirable and will eventually result in a failure. When a shift can not be made without clashing the gears, the cause should be found and remedied. Usually an improperly adjusted clutch is responsible when gears can not be meshed smoothly, because the proper speeds between the countershaft and mainshaft of the transmission can not be maintained. The shift must also be timed correctly so that the gears will be meshed when both the countershaft and mainshaft gears rotate at the same speed.

When chips are broken off the gear teeth they fall in between the gears or lodge in the bottom of the transmission case, and are later picked up by the oil permitting them to enter bearings and lodge between the gears resulting in an expensive failure.



CONTROLS IN CAB

Some are under the impression that when the lubricant is drained from the transmission all the old chips are also removed. Usually the chips will not be removed by draining the oil but will remain lodged somewhere in the case.

Many costly repair bills could be avoided by keeping the clutch in perfect adjustment so that it can be released properly and a smooth shift completed. An analysis we completed plainly shows that the majority of transmission failures are caused by chips lodging between the gear teeth, causing a gear failure, bent shafts, damaged bearings, and sometimes even a broken case. In checking still further we find that these pieces of metal were broken off the gears when shifting, and that the inability to shift properly was caused by a dragging clutch.

Before the trucks leave the factory the clutch has been thoroughly checked for the correct adjustment and release action. It is, however, only natural that the clutch lining

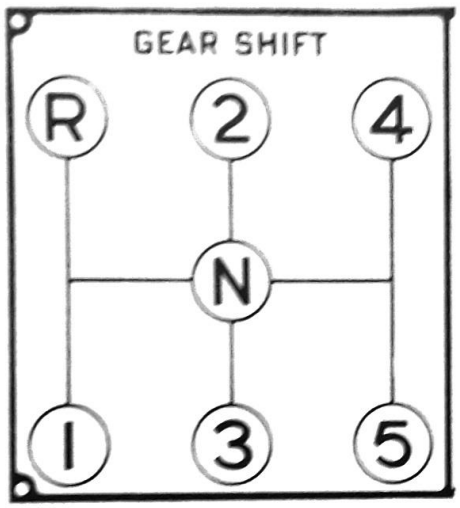
will wear and for that reason a periodical check on the adjustment should be made. This will not only eliminate transmission gear trouble, but will also increase the life of the clutch lining.

Shifting to a Lower Gear

Many operators double clutch when they shift to a lower gear. By this we mean that when the operator shifts from one gear into another, he depresses the clutch pedal and shifts the transmission into a neutral position. He then again engages the clutch and momentarily steps on the throttle to increase the speed of the countershaft in the transmission. The shift is then completed by depressing the clutch pedal and engaging the transmission gears. The operator must remember that an even speed between the countershaft and mainshaft gears to be engaged must be maintained, otherwise a smooth shift cannot be made.

Starting on a Hill

Apply the parking brake. Disengage the clutch and shift to first gear. Let the clutch in slowly, at the same time accelerating the engine with the foot accelerator and gradually releasing the parking brake as the clutch takes hold.



NOTICE—VERY IMPORTANT

There are certain types of service where it is practically impossible to shift to lower gear without stopping the truck. In operation such as snow removal where the momentum of the vehicle is rapidly decreased, the gears on the mainshaft of the transmission also lose their momentum faster than those of the countershaft.

In this type of service it is desirable to bring the truck to a complete stop before attempting to shift. After the truck has been brought to a standstill, the operator should choose the gear necessary to pull through the bad stretch.

Stopping on a Hill

Whenever it is necessary to stop a truck on a hill, be sure that the emergency brake is set up tight before leaving the truck. If grade is particularly steep it is best to block wheels. It is also advisable when stopping on a hill to lock the center differential.

In going down a steep or dangerous hill, close the throttle and allow the engine to assist the brakes in retarding the descent of the truck. In going down exceptionally steep hills it is advisable to change to third or second gear, or even low, in this way obtaining great braking action from the engine. Always leave the hand control and accelerator closed.

Center Differential Lock

Some are under the impression that this truck will drive on all four wheels only when the center differential is locked. This is not true. This truck drives on all four wheels without the center differential lock engaged as long as the wheels have equal traction, and the lock should only be engaged in case of emergencies.

Connected to the lower sprocket is the center differential which is of the bevel gear type. There are certain times, however, when the center differential action should be cut out, making the front and rear axle a rigid drive. Should either the front or rear wheels lose traction, the power is always transmitted

Center Differential Locking Lever

through the channel of the least resistance. This would result in the spinning of one set of wheels while the other remained stationary. In a case of this kind the center differential lock should be engaged, eliminating the differential action and transmitting the power equally through both propeller shafts. This prevents spinning of the wheels and applies the power to the wheels that still have traction, and thereby allows the truck to move on through the difficult places.

When it is necessary to lock the center differential lock, simply increase the tension on the cable by raising the fly lock lever up as far as it will go, so that it will remain locked in this position.

To unlock the center differential, merely place the lever in the unlocked or down position.

There is no mystery whatever about the action of the center differential, as you have learned from the previous paragraphs. The locking device should be used only for emergency work, however, and should be unlocked as soon as possible. To operate constantly with a locked center differential places undue and unnecessary strains on all driving parts.

Lighting Switch

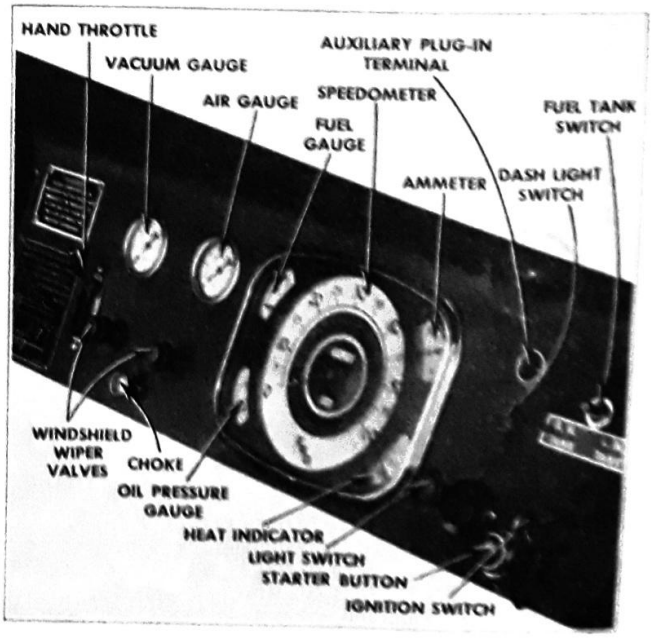
The lighting is controlled from a switch located on the right side of the dash. The switch provides either the selection of service or blackout lights. When the switch knob is pushed in all lights are turned off. When the switch is pulled out to the first stop the blackout head lamps and tail lamps are turned on. With the switch pulled out to this position the blackout stop light is also in contact. To prevent turning on the service lights accidentally, a lock button on the switch must be pressed in before the switch knob can be pulled all the way out to the service light position.

When the service lights are turned on, a selection of the country or traffic beam can be obtained by the foot switch. Pressure on the foot switch button alternately turns on the two beams.

Ammeter

This instrument indicates in amperes the current passing to or from the battery. The pointer, resting on the scale marked "Charge", indicates that the generator is charging the battery. The pointer resting on the scale marked "Discharge", indicates that the battery is discharging.

With all lights off, the ammeter should read "Charge" when the engine is operated above idling speed. When the motor is not running, and all lights and other electrical equipment



Dash Panel

are "off", the ammeter should register at zero.

Engine Oil Pressure Gauge

This is a part of the engine lubrication system. Movement of the pointer indicates that oil is being pumped to the engine.

The gauge should show pressure as soon as the engine is started. Failure to operate is a danger signal and the engine should be stopped immediately.

Fuel Gauge

The fuel gauge on the instrument board indicates the amount of fuel in the fuel tanks. Therefore, as the gauge nears the "empty" position, the supply should be replenished.

Heat Indicator

The heat indicator is a dial reading thermometer, located in the instrument panel on the instrument board, and shows the temperature of the water in the cooling system.

The dial marked 120° indicates a cool motor, 160° is normal temperature and 200° is the danger range.

If the needle on the dial should register in the "danger" range, it indicates an overheated engine. The engine should be stopped and inspected for lack of water or oil, broken fan belt, or other conditions which might cause overheating.

NOTE: If the truck is being operated in a high altitude, or if alcohol is used in the radiator as a non-freezing solution, the boiling temperature will be slightly lower, and this must be kept in mind when reading the instrument.

Speedometer

The speedometer indicates the miles per hour the truck is traveling and is operated by a gear in the sub-transmission. The trip mileage of the speedometer may be turned back to zero at will.

Running Truck on Front or Rear Axles Only

In the event that either the front or rear axle is damaged or disabled, do not attempt to operate the truck without disconnecting the propeller shaft, leading to the damaged axle, at the universal joints, and remove the hub cap driving spiders from dead axle, and lock the center differential.

By removing the hub cap driving spider and the propeller shaft to the disabled axle, the axle becomes "dead" and further damage is prevented.

The truck should not be driven on one axle in heavy work.

TO PREPARE TRUCK FOR SERVICE

First—Inspect chassis and equipment immediately upon receipt of same to check for items damaged or lost in transit.

Second—Fill radiator with clean water.

If temperature is apt to fall below 32 degrees F., fill with solution as directed under General Instructions for Cooling System.

Be sure the drain cocks are closed before filling. They are located on the left side of the motor, one on the cylinder block, one on the water pump and one on the lower radiator connection.

Third—Fill crankcase to proper level with high grade approved oil and take particular care to see that all drain cocks and plugs are tight.

The oil level is indicated on the bayonet type oil gauge, located on the left side of motor.

The proper level for the oil is above the halfway mark on the gauge and nearer the high mark.

A breather tube is located on the right side. It is fitted with a removable cover and is used for filling lubricating system.

Fourth—Fill fuel tanks with fuel.

Fifth—See that all parts have the required lubricant in accordance with the lubrication chart. The chassis is thoroughly lubricated at the factory, but it is well to check over these parts and become familiar with this operation.

LOADING THE TRUCK

The relation between the bulk and the weight of goods to be transported is variable. This makes it impossible to give definite instructions for loading truck to cover all conditions. However, it should be remembered that this motor truck is designed to carry 45% of the total load on the front wheels and 55% on the rear wheels with load uniformly distributed.

Avoid loading the heavy material on one side of the truck or rear of the truck, as this will bring an unfair strain on one set of springs, tires, axles and other parts.